BSPS Forum: What can I do with a major in the pharmaceutical sciences?
BSPS Majors @ UT

- Cosmetic Science & Formulation Design
- Medicinal and Biological Chemistry
- Pharmaceutics
- Pharmacology/Toxicology
- Pharmacy Administration
B.S. IN PHARMACEUTICAL SCIENCES PROGRAM

The Bachelor of Science in Pharmaceutical Sciences (BSPS) degree is a four-year baccalaureate program that includes a required internship. The pharmaceutical sciences represent the collective basic sciences that underlie pharmacy. This degree program is designed for students who wish to attend medical school or pursue careers related to the pharmaceutical industry, pharmaceutical science and research, pharmacy administration and sales, the biomedical industry, forensic science, and health care administration. It also prepares students to enter law school or pursue graduate studies. There are five majors in this degree program:

- Cosmetic Science and Formulation Design (PHCS)
- Medicinal and Biological Chemistry (MBC)
- Pharmaceutics (PHAR)
- Pharmacology/Toxicology (PTOX)
- Pharmacy Administration (PHAM)

Check out the details on each major: http://www.utoledo.edu/pharmacy/academic_programs/bspharmsci_programs/
What Can I Do with a Major in Pharmaceuticals?

As a specialist in pharmaceutics, you will aid in developing, manufacturing, and evaluating products such as tablets, capsules, ointments, and liquids for medicinal, nutritional, and cosmetic use. Pharmaceutics majors prepare for careers in:

- Research
- Quality control/quality assurance
- Drug delivery
- Packaging
- Product development/formulation
- Drug stability testing
- Production/manufacturing
- Regulatory affairs

Pharmaceutics majors are also prepared to pursue M.S. or Ph.D. degrees in pharmaceutics, as well as enter medical/osteopathic, dental, M.B.A., or law programs.

A Sample of Related Career Opportunities:

- Pharmacy
- Regulatory Affairs
- Quality Control
- Research and Development
- Sales and Marketing
- Retail Pharmacy
- Supply Chain Management
- Clinical Research

What Can I Do with a Major in Pharmacology and Toxicology?

Pharmacology and Toxicology graduates pursue careers in the pharmaceutical and chemical industries, and at universities, research institutes, and state, local and federal governmental agencies. Pharmacologists, emphasizing the mechanisms by which drugs act, draw on the disciplines of physiology, pathology, biochemistry, biology, and microbiology to examine the actions of chemicals on living organisms. Toxicologists are engaged in the investigation of poisons, or toxins, from the standpoint of detection, isolation, identification, and determination of their effects on the human body.

Pharmacologists and toxicologists work together as part of a multidisciplinary team, which may include synthetic chemists, cell and molecular biologists, clinicians, and

What Can I Do with a Major in Medicinal and Biological Chemistry?

Medicinal and Biological Chemistry (MBC) is an interdisciplinary science with areas of focus in synthetic organic chemistry, biochemistry, molecular biology, biotechnology, pharmacology, and pharmaceutical chemistry underlying the design, synthesis and development of drugs. The MBC major offers an entry to applied research in rational drug design and provides training in science research for the development of new drugs and therapeutics.

A Sample of Related Career Opportunities:

- Biotechnology
- Pharmaceutical Sales
- Clinical Research
- Regulatory Affairs
- Quality Control
- Research and Development
- Sales and Marketing

Which majors would you like to explore? Email your selection to BSPSOffice@utoledo.edu for a copy of these handouts.
Do you enjoy science and want to pursue a science-based career?

Do you like to work hands-on in a laboratory setting?

Do you have a desire to contribute to the health and well-being of society through the development of medicines and therapies?

*If so, a career in pharmaceutical sciences may be a good choice for you!*
Pharmaceutical scientists are typically involved in the **discovery**, **development** and **delivery** of drugs as well as the pharmaco**economics** and related regulatory activities.

They spend most of their time doing research in a laboratory or office setting.
BSPS Cosmetic Science and Formulation Design Degree

DR. GABRIELLA BAKI
COLLEGE OF PHARMACY AND PHARMACEUTICAL SCIENCES
THE UNIVERSITY OF TOLEDO
BSPS Cosmetic Science and Formulation Design

- Not cosmetology!
- 4-year science-based program
- First and only undergraduate program in the US
Focus of the Major

Makeup products and personal care products
What Is Cosmetic Science?
Unique Features

**US Cosmetic Industry**

- **Recession-proof:** increased sales during recession!
- **2016:** most valuable beauty and personal care market in the world
- **Skin care** products make up largest part of the market (36.4%)
- **In need** of well-trained scientists

**BSPS Cosmetic Science and Formulation Design**

- Science, business and art classes
- Typical **business minors:** sales and marketing
- Intensive product **formulation** training and hands-on experience
- **Guest speakers** from the industry
Common Job Titles

- Cosmetic chemist = Formulation chemist
- Quality control specialist
- Technical marketing manager
- Technical sales personnel
- Product performance evaluator
- Safety testing personnel
- Regulatory specialist
- Supply chain management specialist
Positions of UT PCOS Graduates

- Formulation: 70% of graduates
- Regulatory Affairs: 10% of graduates
- Marketing: 5% of graduates
- QC: 5% of graduates
- Sales: 5% of graduates
More Information

Useful links:
- BSPS Cosmetic Science and Formulation Design
- Cosmetic Science and Formulation Design degree at UT

YouTube Videos:
- Making Makeup
- I love my major
- Cosmetic Science at UT
Medicinal and Biological Chemistry

Training in science research for the development of new drugs and therapeutics
Medicinal Chemistry: chemistry, biochemistry and biotechnology applied to drug design
MBC Major

• Theme is rational drug design

• Good choice for someone who likes
  – Chemistry, biochemistry, molecular life science, or immunology
  – Laboratory work
  – Research

• Program requirements
  – Advanced laboratory (3 cr. hrs with more recommended)
  – Additional elective courses and practical laboratory experiences (22 cr. hrs) in advanced physical science and life science
  – Year 4: Capstone courses in Targeted Drug Design (3 cr. hrs.)
  – 22 semester hours of professional elective

• Opportunity for undergraduate research
Preparation for Lab Work
Theory and Practice
• **Overall Emphasis on Development of Laboratory Skills:**
  – chemical synthesis, characterization and chemical analysis
  – capacity to handle and analyze biological materials (cells and receptor preparations) that are important in drug characterization.

• **Emphasis on learning by doing**—ideally you start out under close supervision ...finish working relatively independently
• What do you do with the degree? What will my life be like? Who is going to pay me to do this kind of work and how much?

  – Work in industry or in government or a foundation lab as a technical assistant.
  
  – You will function as a junior member of a drug design team, but usually with a supervisor who works along side you.

• You can go on for further training and obtain master’s degree (1-2 additional years) or doctorate (4-6 additional years).

  – Excellent preparation for medical or dental school, where exposure to research is valued (evidence based practice)
What are the Rewards?

• Salary and compensation
• Job Satisfaction-doing something difficult that is important
  – Responsibility
  – Professional Advancement
  – Opportunity to contribute
  – Genuinely interesting work that is always new
  – Access to a health care professional program
US Base Annual Salary By Experience And Education

Education = BS

base: 148 reporting US full-time employees with BS

AAPS 2011 Salary Survey
Exhibit 2.34

US Base Annual Salary By Education

base: 1044 reporting US full-time employees
The MBC major offers an entry to applied research in rational drug design
**Pharmaceutics** is a multidisciplinary applied science which studies the physical and chemical attributes of drugs. It places a strong emphasis on the design and evaluation of drug delivery systems and dosage forms and on the understanding and control of the factors influencing clinical response to drug therapy.

**Career Opportunities:** Students are prepared for a wide range of career opportunities as drug analysts, manufacturing/production technologists, quality control inspectors, technical writers, sales representatives, and research associates in the pharmaceutical industry and in government. Graduates can also move on to graduate studies in the field, medical school, or other professional school.
JERRY NESAMONY, PH.D.

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PHARMACOLOGY/TOXICOLOGY
Dr. Ming Liu
Pharmacology and Toxicology are biomedical sciences which focus on how to develop safe, effective drugs and prevent the harmful effects of chemicals.

Pharmacology focuses on the way drugs interact with various living systems that includes the properties, effects, and mechanisms of drug action.

Toxicology focuses on the interaction of toxic compounds in the body that includes exposure assessment, dose response assessment, and hazard identification.
Career Opportunities: It prepares students to work as a pharmacologist and toxicologist in the biomedical industry, pharmaceutical industry, nutritional industries, environmental conservation and pollution control, scientific civil service, governmental agencies, forensic sciences, and research institutes.
Ming-Cheh Liu, Ph.D.

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PHARMACY ADMINISTRATION
DR. VARUN V AIIDYA
**Pharmacy Administration** focuses on the outcomes and business aspects of pharmacy and healthcare in general. The curriculum focuses on the healthcare landscape and the business of healthcare, along with foundational health systems courses and business classes.

**Career Opportunities:** Graduates are employed by community pharmacies as regional/division managers, by hospitals, health systems, by pharmaceutical and medical device companies or as division heads at various federal and state organizations.
VARUN VAIDYA, PH.D.

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An internship is required in all BSPS majors; our internship office works closely with you to secure an internship.

Students work on campus, around the country, and at our international partner sites.
Joining a research team as a first- or second-year PRE-Professional student is *strongly* recommended for all majors.

Summer funding may be available through the [Office of Undergraduate Research](#).

Contact us to find out about current research openings.
Summer Research in the Pharmaceutical Sciences

Wed., Nov. 7, 2018  5:00 – 6:30 pm
Main Campus - Wolfe Hall 1240

- Money for summer research
- Meet BSPS Faculty
- Free Pizza!

Let us know by 11/5 if you are attending:
BSPSOffice@utoledo.edu
CONTACT THE MAJOR COORDINATORS:

Cosmetic Science and Formulation Design (PCOS) Major: Program Coordinator – Dr. Gabriella Baki, Wolfe Center 114-F, 419-383-1973, gabriella.baki@utoledo.edu

Medicinal & Biological Chemistry (MBC) Major: Program Coordinator & BSPS Program Director – Dr. Jim Slama, Wolfe Center 274-E, 419-383-1925, james.slama@utoledo.edu

Pharmacology/Toxicology (PTOX) Major: Program Coordinator – Dr. Ming Liu, Wolfe Center 284-C, 419-383-1918, ming.liu@utoledo.edu

Pharmaceutics (PHAR) Major: Program Coordinator – Dr. Jerry Nesamony, Wolfe Center 114-J, 419-383-1938, jerry.nesamony@utoledo.edu

Pharmacy Administration (PHAM) Major: Program Coordinator – Dr. Varun Vaidya, Wolfe Center 115-D, 419-383-1516, varun.vaidya@utoledo.edu

Call or email us!
ADDITIONAL QUESTIONS?

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College of Pharmacy & Pharmaceutical Sciences

Frederic & Mary Wolfe Center, on UT’s Health Science Campus